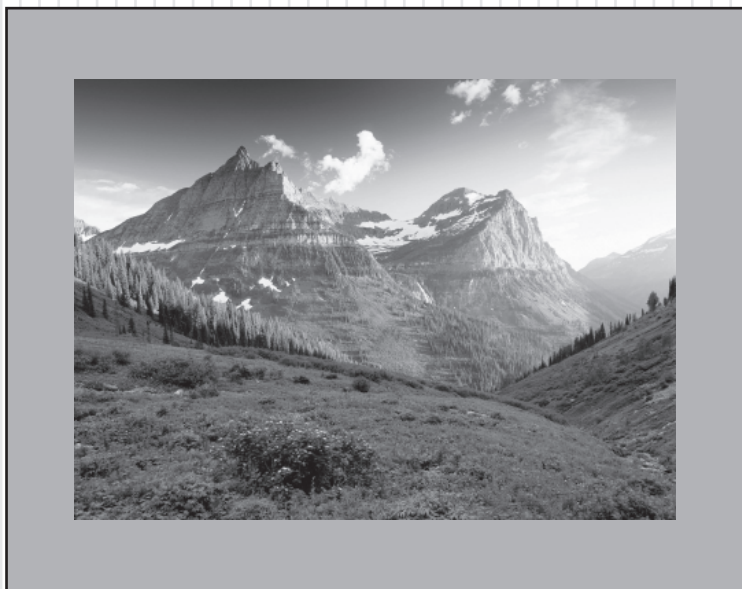


Montana
Comprehensive Assessment
System (MontCAS, Phase 2)
Criterion-Referenced Test (CRT)

COMMON CONSTRUCTED-RESPONSE ITEM RELEASE
MATHEMATICS, GRADE 7

2006



OFFICE OF PUBLIC INSTRUCTION

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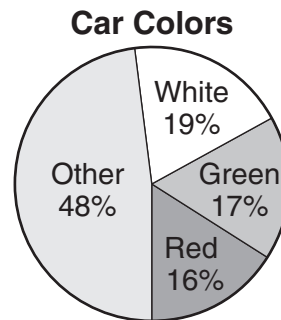
Mathematics

Session 1 (Calculator)

You may use a calculator during this session.

25. The manager of Standard Auto has been using the table below to keep track of the colors of cars his customers order. He made this graph to display the data.

Car Colors	
Color	Percent of Customers
White	19%
Green	17%
Red	16%
Brown	10%
Black	6%
Silver	5%
Blue	13%



- Describe one advantage and one disadvantage of the graph the manager made of the data.
- On the grid in your Student Response Booklet, make a bar graph of the data in the table. Be sure to title your graph, label your axes, and show appropriate scale.

Scoring Guide

Score	Description
4	4 points
3	3 - 3½ points
2	1½ - 2½ points
1	½ - 1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Scoring Notes

Part a: (maximum 1 point)

½ point for a reasonable advantage
AND

½ point for a reasonable disadvantage

Part b: 3 points for a complete and correct bar graph with title, y-axis, and bars labeled with a correct scale
OR

2 points for a mostly correct graph with at most 2 minor errors (missing labels, minor scale error, incorrect bar)
OR

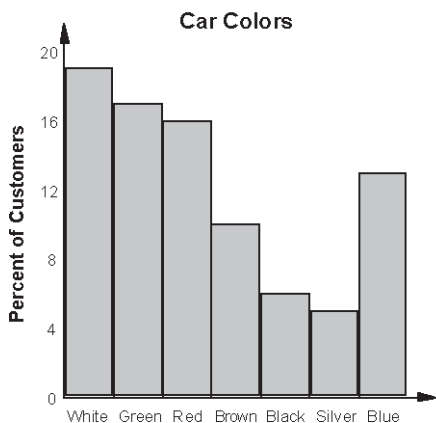
1 point for a graph where the scale is mostly correct and at least 3 of the bars are accurately represented – labels and title may be missing
or
for a graph that is not a bar graph but otherwise is correct

Sample Response

Part a: Answers will vary. A sample acceptable response follows.

One advantage to the graph is that it is easier to read, since there are only 4 sections. One disadvantage is that it makes it appear that other car colors are more popular than white, red, and green.

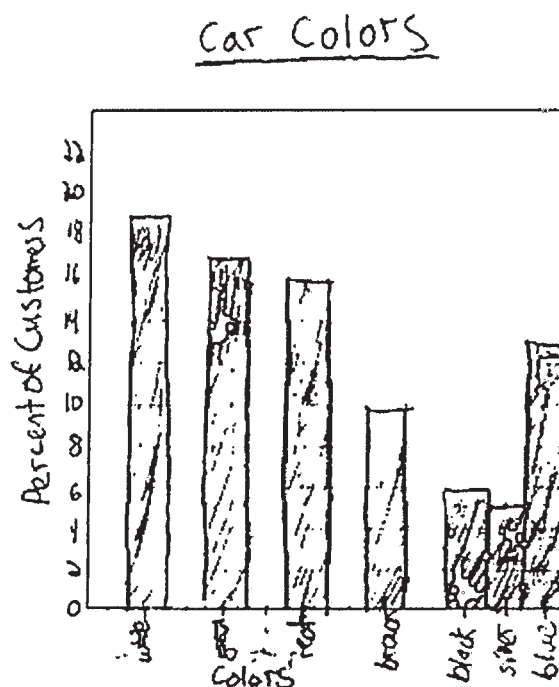
Part b:



Score Point 4

Sample 1

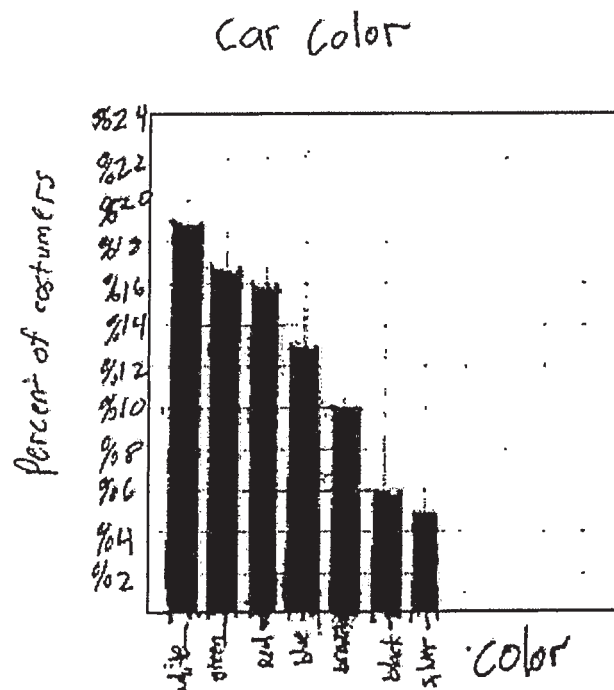
One disadvantage of the graph the manager made is that it does not show what percent of customers chose Blue, Brown, Black, or Silver. One advantage of the graph the manager made is that you can see the top three car colors the customers chose in contrast with the other colors.



Score Point 4

Sample 2

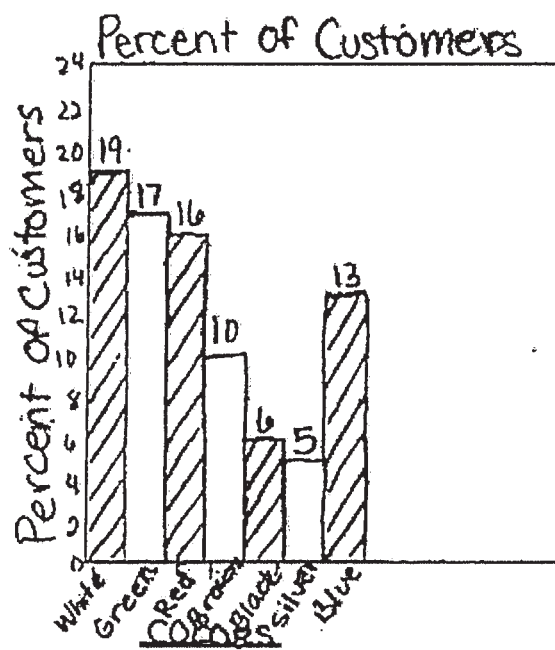
One advantage to the managers graph is that you know which color is more popular. One disadvantage to his graph is that you don't know what colors are in the category other.



Score Point 3

Sample 1

The graph tells what colors the manager has in his parking lot and what percent of people buy those colors of cars.

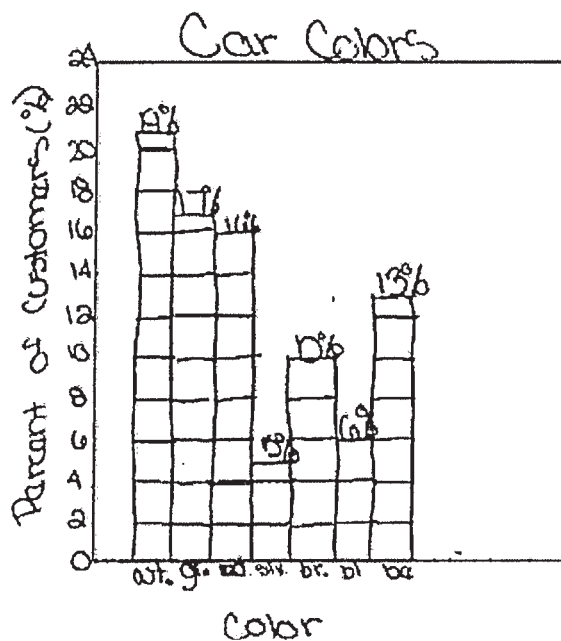


Score Point 3

Sample 2

One advantage of the graph the manager made is that the graph is accurate and shows what color cars are purchased the most. One disadvantage of the graph the manager made is that it doesn't show all of the colors available at Standard Auto.

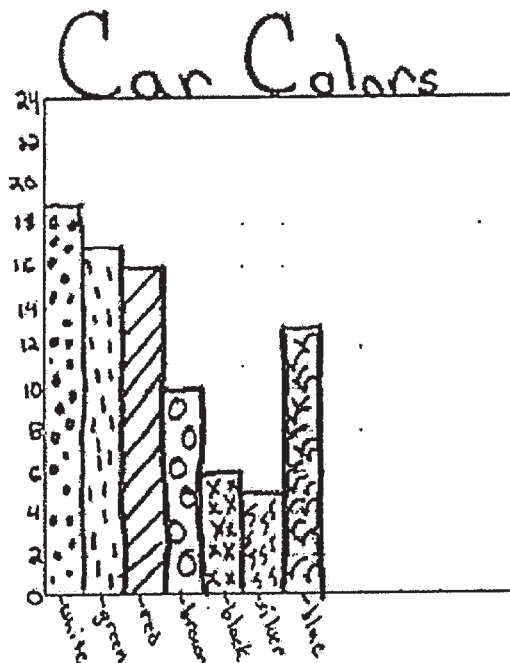
key:
white - wt
green - gr.
red - red
silver - slv.
brown - br
black - bl
blue - be



Score Point 2

Sample 1

1 advantage to the graph on the left is it shows all of the colors not just 4 like the one on the right. 1 disadvantage is that the graph on the left takes up more space than the one on the right!

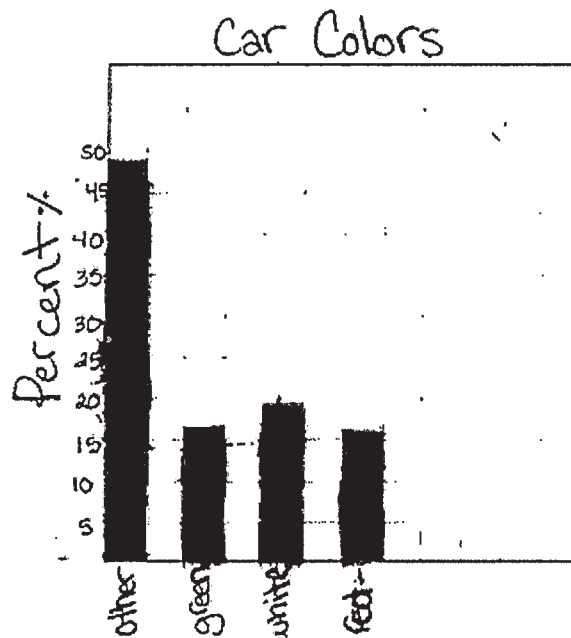


Score Point 2

Sample 2

a.) One advantage is it will help him keep track of the colors of cars and it is organized. One disadvantage is that the percents don't equal 100% so he you don't know what the other 14% of car colors left over are.

b.)



Score Point 1

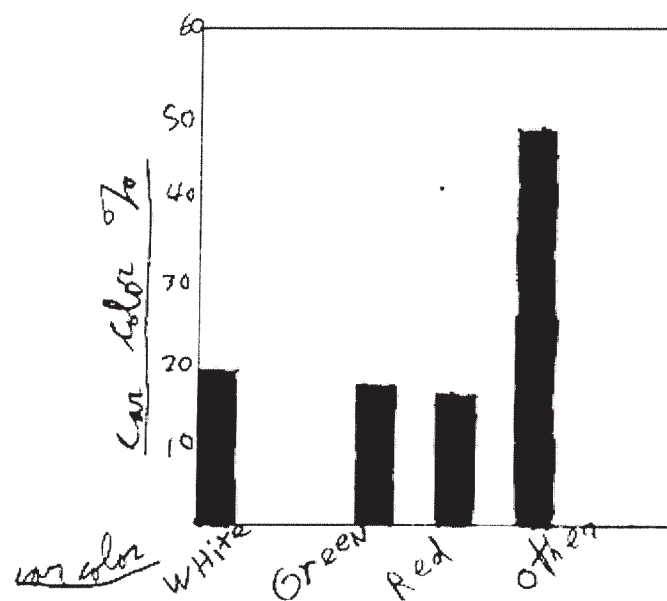
Sample 1

A, One advantage is that white is the highest.
One disadvantage it has other instead of the
three colors,

White	19%
Green	17%
Red	16%
Brown	10%
Black	6%
Silver	5%
Blue	13%

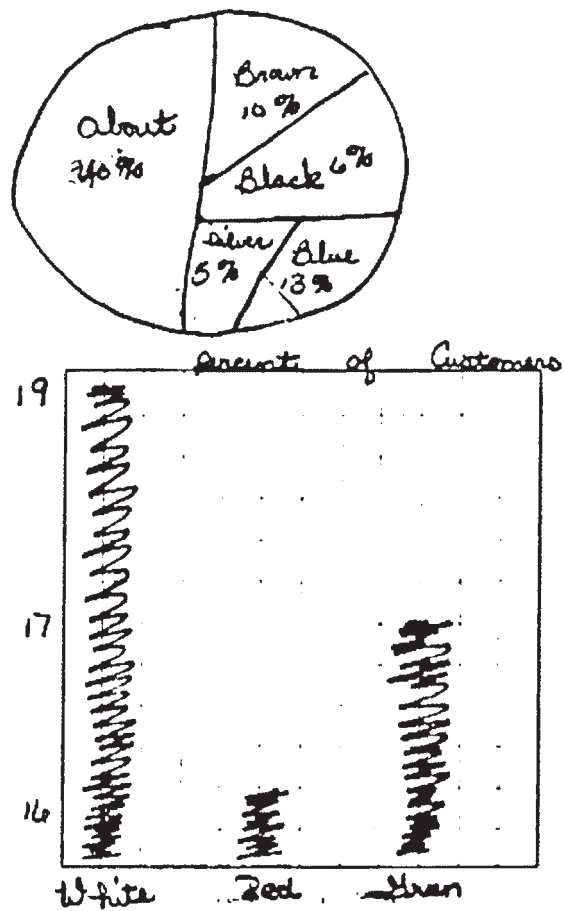
Score Point 1

Sample 2



Score Point 0

Sample 1



a. One advantage is that he has all the listings
b. a disadvantage is that he should have put them
in alphabetical order, or else from the time he got
them so he could find which one he was looking
for easier.

b.



Car Colors	
White	19%
Green	17%
Red	16%
Brown	10%
Black	6%
Silver	5%
Blue	13%

Mathematics

Session 3 (No Calculator)

You may NOT use a calculator during this session.

68. Mr. Brady and Mrs. Johnson have a total of 60 boys and 48 girls in their physical education classes. The teachers want to combine the classes, and then use these three rules to divide the students into smaller groups.
- Each group must contain both boys and girls.
 - There must be an equal number of girls in each group.
 - There must be an equal number of boys in each group.
- a. Separate the students in three different ways using the rules above. For **each** of your three ways, be sure to tell how many boys and how many girls would be in each group and how many groups there would be. Show all of your work.
- b. Is it possible to use the three rules to split the students into 5 groups? Explain your answer.

Scoring Guide

Score	Description
4	11 points
3	8 – 10 points
2	5 – 7 points
1	1 – 4 points
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Scoring Notes

Part a: (maximum 9 points)

1 point for **each** correct number of boys, girls, and number of groups in each grouping

Part b: 2 points for correct answer and work/explanation
OR

1 point for correct work/explanation

Sample Response

Part a: Student only needs 3 of the following possibilities.

There can be 2 groups with 30 boys and 24 girls.

There can be 3 groups with 20 boys and 16 girls.

There can be 4 groups with 15 boys and 12 girls.

There can be 6 groups with 10 boys and 8 girls.

There can be 12 groups with 5 boys and 4 girls.

Part b: There cannot be 5 groups since 5 is not a factor of 48.

Score Point 4

Sample 1

- a. 2 groups - 30 boys - 24 girls in each
3 groups - 20 boys - 16 girls in each
12 groups - 5 boys - 4 girls in each
- b. 5 groups - 12 boys - girls can't be divided equally

Score Point 4

Sample 2

$$\begin{array}{l} 60 \text{ boys} \\ 48 \text{ girls} \end{array} = \boxed{108 \text{ students}}$$

$$\begin{array}{l} \text{a. 1. } 4 \text{ girls} \\ 5 \text{ boys} \end{array} \left| \begin{array}{l} 9 \text{ students} \\ \text{each group} \end{array} \right. \\ \hline 12 \text{ groups}$$

$$\begin{array}{l} \text{a. 2. } 8 \text{ girls} \\ 10 \text{ boys} \end{array} \left| \begin{array}{l} 18 \text{ students} \\ \text{each group} \end{array} \right. \\ \hline 6 \text{ groups}$$

$$\begin{array}{l} \text{a. 3. } 12 \text{ girls} \\ 15 \text{ boys} \end{array} \left| \begin{array}{l} 27 \text{ students} \\ \text{each group} \end{array} \right. \\ \hline 4 \text{ groups}$$

2. No. 60 (boys) is divisible by 5, but 48 is not. There would be 3 girls left over.

$$60 \div 6$$

$$\begin{array}{r} 26 \\ 310 \\ 412 \\ 5 \end{array}$$

$$48 \div 6$$

$$\begin{array}{r} 26 \\ 38 \\ 412 \\ 12 \end{array}$$

$$\begin{array}{r} 8 \text{ girls} \\ 10 \text{ boys} \\ 418 \\ \times 6 \\ \hline 108 \end{array}$$

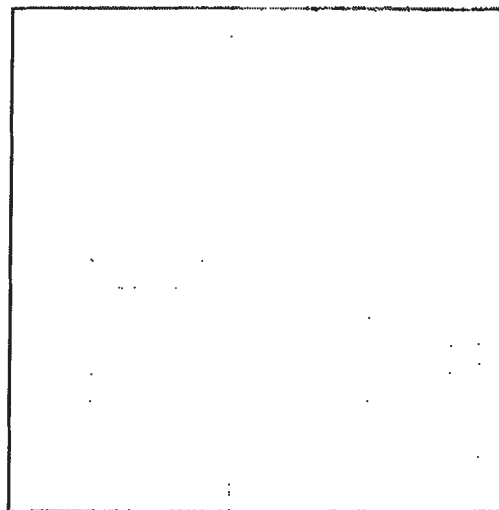
$$\begin{array}{r} 12 \\ \times 15 \\ \hline 27 \\ 150 \\ \hline 180 \end{array}$$

$$\begin{array}{r} 4 \text{ girls} \\ 5 \text{ boys} \\ \hline 9 \end{array}$$

$$9 \overline{)108}$$

12 girls
12 boys

$$\begin{array}{r} 16 \\ 3 \overline{)48} \\ \underline{-3} \\ 18 \end{array}$$



Score Point 3

Sample 1

answer: a. 4 girls and 5 boys in 12 groups

8 girls and 10 boys in 6 groups

12 girls and 15 boys in 4 groups

b. Yes, you can have 24 girls and 30 boys in 2 groups or
16 girls and 20 boys in 2 groups along with all the
other groupings makes five

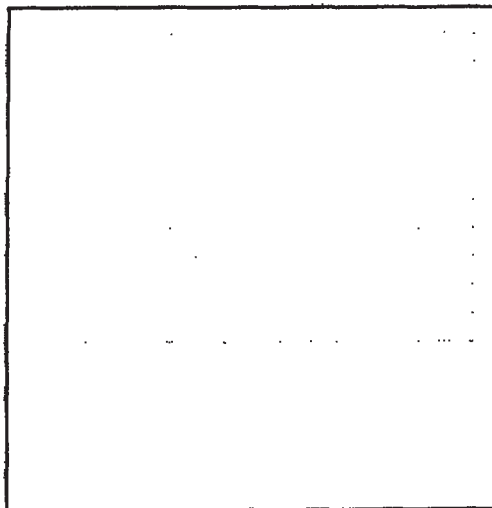
$$\begin{array}{r} 5 \\ 12 \overline{)60} \\ \underline{60} \\ 0 \end{array} \quad \begin{array}{r} 4 \\ 12 \overline{)48} \\ \underline{48} \\ 0 \end{array}$$

$$\begin{array}{r} 16 \\ 6 \overline{)96} \\ \underline{96} \\ 0 \end{array} \quad \begin{array}{r} 8 \\ 6 \overline{)48} \\ \underline{48} \\ 0 \end{array}$$

$$\begin{array}{r} 15 \\ 4 \overline{)60} \\ \underline{60} \\ 0 \end{array} \quad \begin{array}{r} 12 \\ 4 \overline{)48} \\ \underline{48} \\ 0 \end{array}$$

$$\begin{array}{r} 24 \\ 2 \overline{)48} \\ \underline{48} \\ 0 \end{array} \quad \begin{array}{r} 20 \\ 2 \overline{)40} \\ \underline{40} \\ 0 \end{array}$$

$$\begin{array}{r} 26 \\ 3 \overline{)78} \\ \underline{78} \\ 0 \end{array} \quad \begin{array}{r} 16 \\ 3 \overline{)48} \\ \underline{48} \\ 0 \end{array}$$



Score Point 3

Sample 2

- 1.)³ There would be 5 groups of 12 boys + 4 groups of 12 girls
- 2.)⁶ There would be 12 groups of 5 boys + 12 groups of 4 girls
- 3.)⁶ There would be 6 groups of 10 boys + 6 groups of 8 girls.

④ No, because if you have to have unequal number of boys and girls in each class, 48 can not be divided by 5 but 60 can

a) (16 girls + 20 boys would make it equal amounts.)

24 girls and 30 boys *

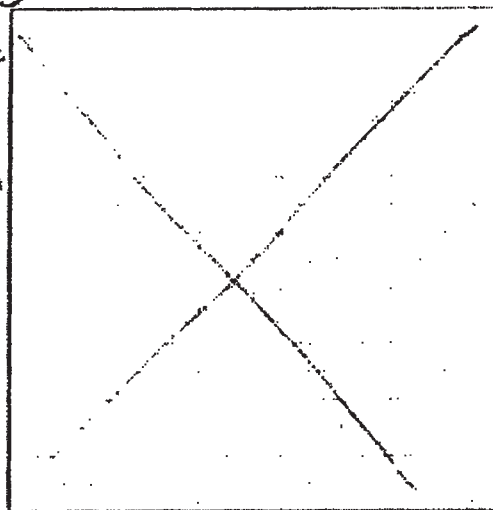
8 girls and 10 boys

16 girls and 20 boys

(48)

(60)

b) no, because all of the factors for each number (for 60: 10, 20, 30 etc.) will add up to more than the total of boys + girls total,



Sample 2

$$\begin{array}{r} 16 \\ 3 \overline{) 48} \\ \underline{3} \\ 18 \end{array}$$

b. no, 48 is not divisible by 5.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	5
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Score Point 1

Sample 1

60 - B 15 15 15 15
48 - G 12 12 12 12



b. No because there's not enough girls

Score Point 1

Sample 2

a. there would be 36 students in one group.
there are 20 boys and 16 girls in each group.

b. no, because 48 can't be divide by 5.

Score Point 0

Sample 1

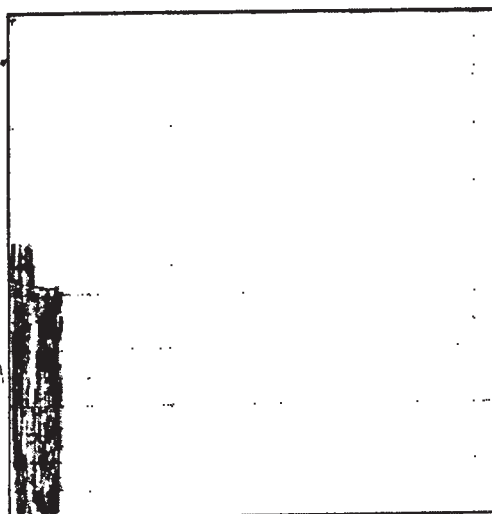
60 boys and 48 girls P.E. class

$$\begin{array}{r} 12 \\ 5 \overline{) 60} \\ \underline{-60} \\ 0 \end{array}$$

$$\begin{array}{r} 12 \\ 5 \overline{) 60} \\ \underline{60} \\ 0 \end{array}$$

$$\begin{array}{r} 9 \frac{3}{5} \\ 5 \overline{) 48} \\ \underline{45} \\ 3 \end{array}$$

Yes, you can have 5 groups.
All the boys will go in evenly But the girls will not go in evenly
No, it is not possible to get all the children into even groups by the 3 rules.



Score Point 0

Sample 2

$$\begin{array}{l} 21. \\ 19 \text{ groups} = 24 \text{ girls} + 24 \text{ boys} \quad 12 \text{ girls} + 12 \text{ boys} = 1 \text{ group} \\ 48 + 48 = 1 \text{ group} \end{array}$$

B, There are more boys than girls, NO